



# PMDXB1200UPE

30 V, dual P-channel Trench MOSFET

25 March 2015

Product data sheet

## 1. General description

Dual P-channel enhancement mode Field-Effect Transistor (FET) in a leadless ultra small DFN1010B-6 (SOT1216) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

## 2. Features and benefits

- Low threshold voltage
- Leadless ultra small and ultra thin SMD plastic package 1.1 x 1.0 x 0.37 mm
- Trench MOSFET technology
- ElectroStatic Discharge (ESD) protection > 2 kV HBM

## 3. Applications

- Relay driver
- High-speed line driver
- High-side loadswitch
- Switching circuits

## 4. Quick reference data

Table 1. Quick reference data

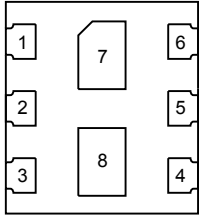
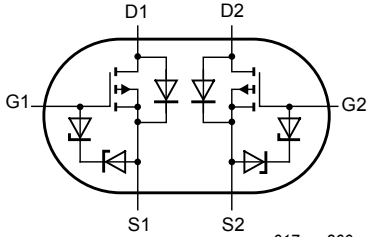
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
$V_{DS}$	drain-source voltage	$T_j = 25\text{ °C}$	-	-	-30	V
$V_{GS}$	gate-source voltage		-8	-	8	V
$I_D$	drain current	$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-410	mA
<b>Static characteristics (per transistor)</b>						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = -4.5\text{ V}; I_D = -410\text{ mA}; T_j = 25\text{ °C}$	-	1.2	1.4	$\Omega$

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 1 cm<sup>2</sup>.

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### 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S1	source TR1	 <p>Transparent top view <b>DFN1010B-6 (SOT1216)</b></p>	 <p>017aaa260</p>
2	G1	gate TR1		
3	D2	drain TR2		
4	S2	source TR2		
5	G2	gate TR2		
6	D1	drain TR1		
7	D1	drain TR1		
8	D2	drain TR2		

### 6. Ordering information

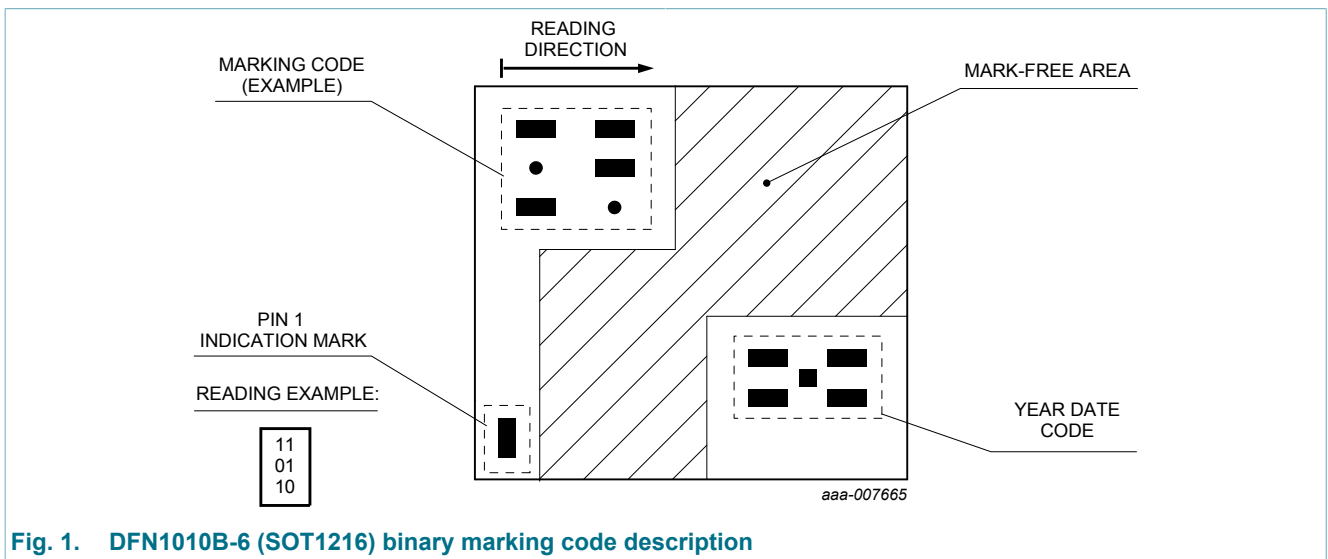
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMDXB1200UPE	DFN1010B-6	DFN1010B-6: plastic thermal enhanced ultra thin small outline package; no leads; 6 terminals	SOT1216

### 7. Marking

Table 4. Marking codes

Type number	Marking code
PMDXB1200UPE	11 10 00



## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per transistor</b>						
$V_{DS}$	drain-source voltage	$T_j = 25\text{ °C}$		-	-30	V
$V_{GS}$	gate-source voltage			-8	8	V
$I_D$	drain current	$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-410	mA
		$V_{GS} = -4.5\text{ V}; T_{amb} = 100\text{ °C}$	[1]	-	-260	mA
$I_{DM}$	peak drain current	$T_{amb} = 25\text{ °C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	-1.7	A
$P_{tot}$	total power dissipation	$T_{amb} = 25\text{ °C}$	[2]	-	285	mW
			[1]	-	410	mW
		$T_{sp} = 25\text{ °C}$		-	4030	mW
<b>Source-drain diode</b>						
$I_S$	source current	$T_{amb} = 25\text{ °C}$	[1]	-	-410	mA
<b>Per device</b>						
$T_j$	junction temperature			-55	150	°C
$T_{amb}$	ambient temperature			-55	150	°C
$T_{stg}$	storage temperature			-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain  $1\text{ cm}^2$ .

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



Fig. 2. Normalized total power dissipation as a function of junction temperature

$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ\text{C})}} \times 100 \%$$



Fig. 3. Normalized continuous drain current as a function of junction temperature

$$I_{der} = \frac{I_D}{I_{D(25^\circ\text{C})}} \times 100 \%$$

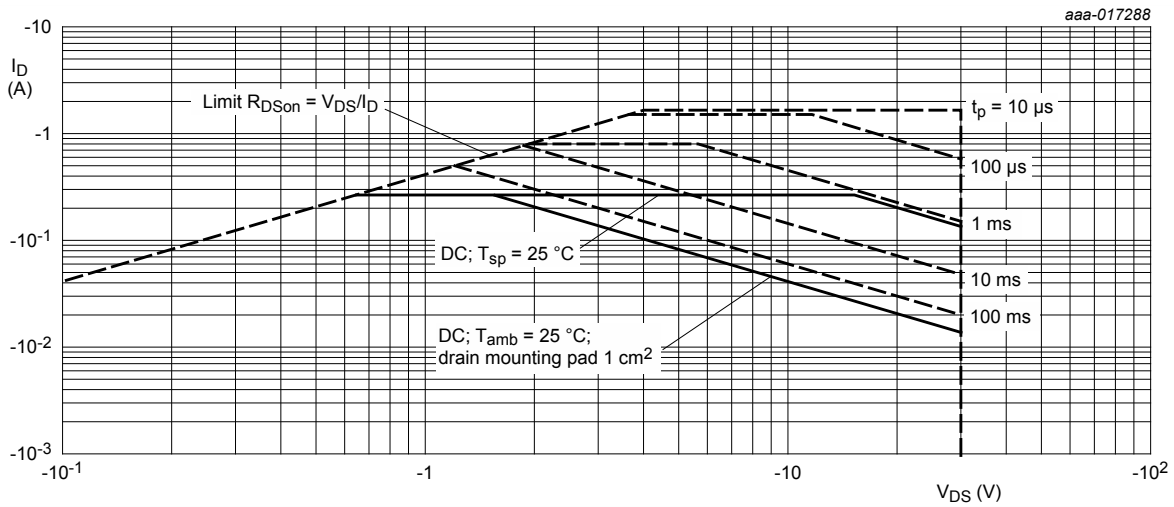


Fig. 4. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b>Per transistor</b>							
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	380	440	K/W
			[2]	-	275	305	K/W

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	27	31	K/W

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm<sup>2</sup>.

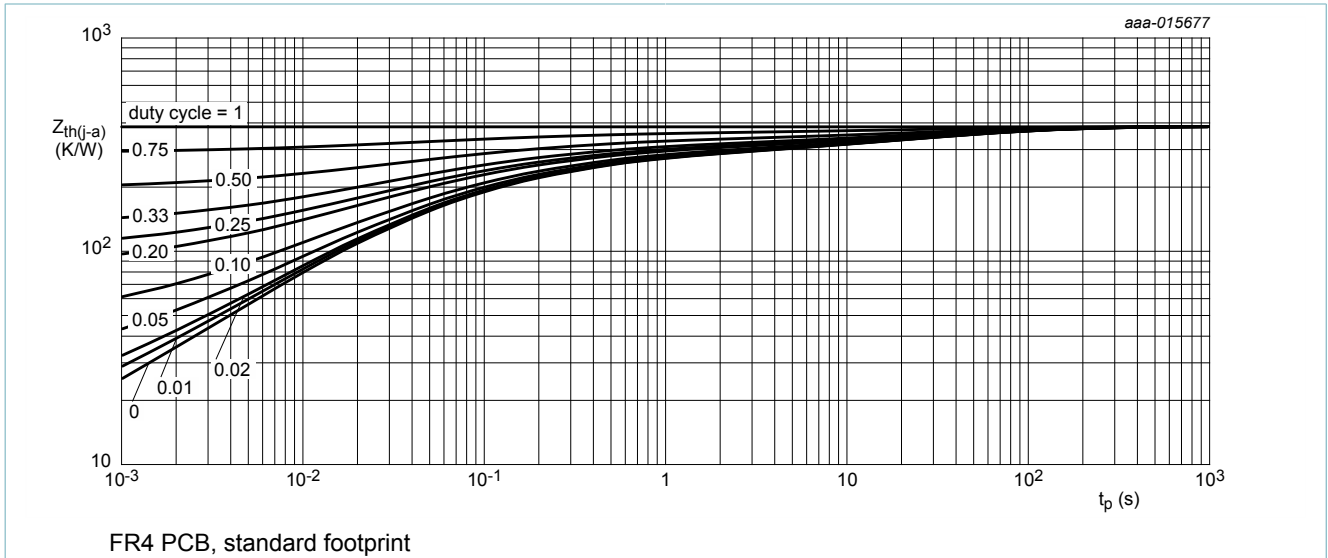


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

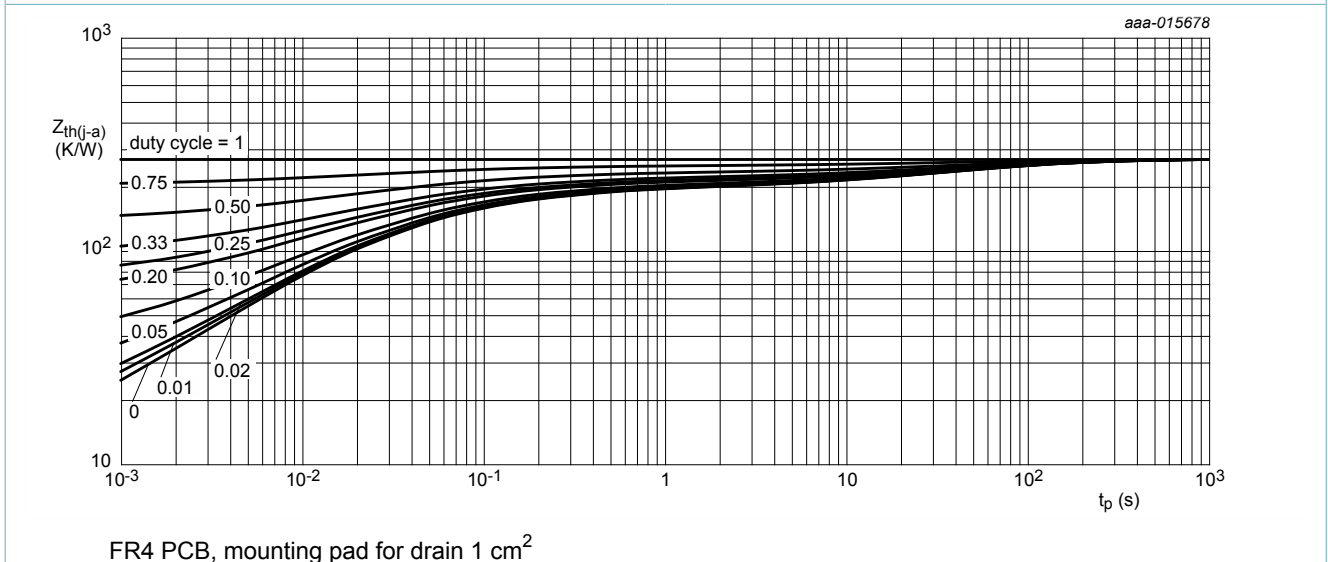
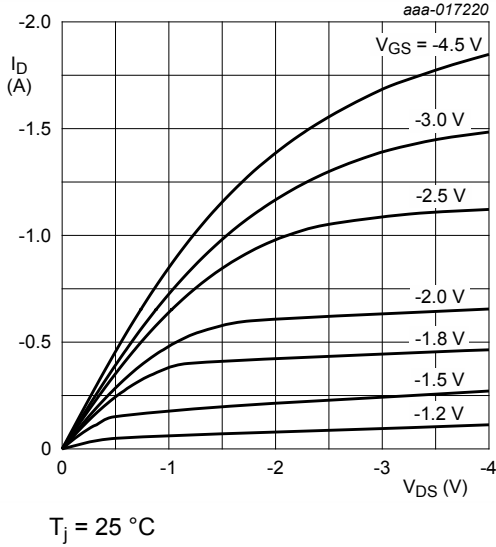


Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

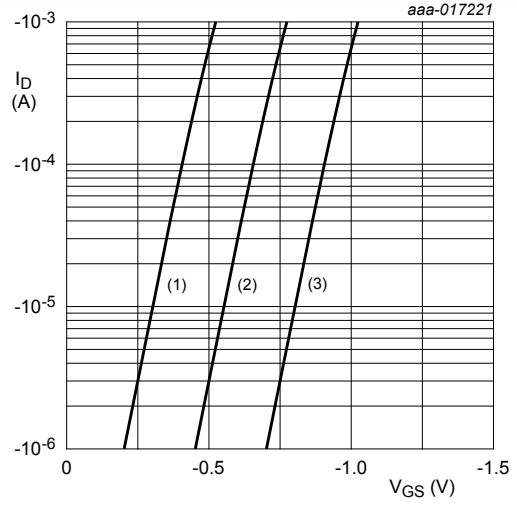
## 10. Characteristics

Table 7. Characteristics

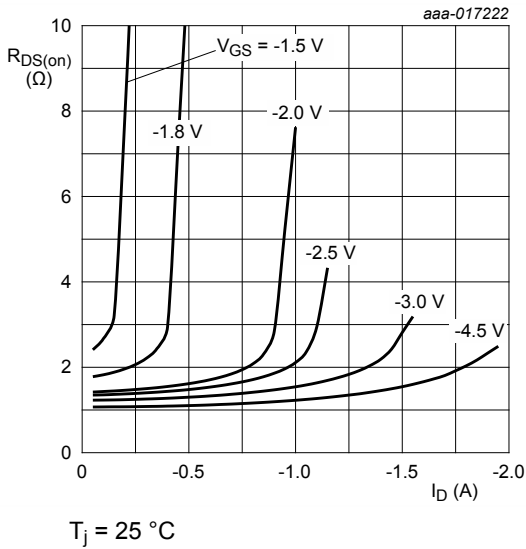
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics (per transistor)</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -250 \mu A$ ; $V_{GS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-30	-	-	V
$V_{GSth}$	gate-source threshold voltage	$I_D = -250 \mu A$ ; $V_{DS} = V_{GS}$ ; $T_j = 25 \text{ }^\circ C$	-0.45	-0.7	-0.95	V
$I_{DSS}$	drain leakage current	$V_{DS} = -30 V$ ; $V_{GS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	-1	$\mu A$
$I_{GSS}$	gate leakage current	$V_{GS} = 8 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	5	$\mu A$
		$V_{GS} = -8 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	-5	$\mu A$
		$V_{GS} = 4.5 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	1	$\mu A$
		$V_{GS} = -4.5 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	-1	$\mu A$
		$V_{GS} = 2.5 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	100	nA
		$V_{GS} = -2.5 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	-100	nA
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = -4.5 V$ ; $I_D = -410 \text{ mA}$ ; $T_j = 25 \text{ }^\circ C$	-	1.2	1.4	$\Omega$
		$V_{GS} = -4.5 V$ ; $I_D = -410 \text{ mA}$ ; $T_j = 150 \text{ }^\circ C$	-	2	2.4	$\Omega$
		$V_{GS} = -2.5 V$ ; $I_D = -320 \text{ mA}$ ; $T_j = 25 \text{ }^\circ C$	-	1.7	2.3	$\Omega$
		$V_{GS} = -1.8 V$ ; $I_D = -80 \text{ mA}$ ; $T_j = 25 \text{ }^\circ C$	-	2.1	3.1	$\Omega$
		$V_{GS} = -1.5 V$ ; $I_D = -10 \text{ mA}$ ; $T_j = 25 \text{ }^\circ C$	-	3	5.1	$\Omega$
$g_{fs}$	forward transconductance	$V_{DS} = -10 V$ ; $I_D = -410 \text{ mA}$ ; $T_j = 25 \text{ }^\circ C$	-	820	-	mS
<b>Dynamic characteristics (per transistor)</b>						
$Q_{G(tot)}$	total gate charge	$V_{DS} = -15 V$ ; $I_D = -410 \text{ mA}$ ;	-	0.7	1.2	nC
$Q_{GS}$	gate-source charge	$V_{GS} = -4.5 V$ ; $T_j = 25 \text{ }^\circ C$	-	0.17	-	nC
$Q_{GD}$	gate-drain charge		-	0.16	-	nC
$C_{iss}$	input capacitance	$V_{DS} = -15 V$ ; $f = 1 \text{ MHz}$ ; $V_{GS} = 0 V$ ;	-	43.2	-	pF
$C_{oss}$	output capacitance	$T_j = 25 \text{ }^\circ C$	-	5.9	-	pF
$C_{rss}$	reverse transfer capacitance		-	4.2	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = -15 V$ ; $I_D = -410 \text{ mA}$ ;	-	3	-	ns
$t_r$	rise time	$V_{GS} = -4.5 V$ ; $R_{G(ext)} = 6 \Omega$ ; $T_j = 25 \text{ }^\circ C$	-	4	-	ns
$t_{d(off)}$	turn-off delay time		-	14	-	ns
$t_f$	fall time		-	5	-	ns
<b>Source-drain diode (per transistor)</b>						
$V_{SD}$	source-drain voltage	$I_S = -410 \text{ mA}$ ; $V_{GS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-0.95	-1.2	V



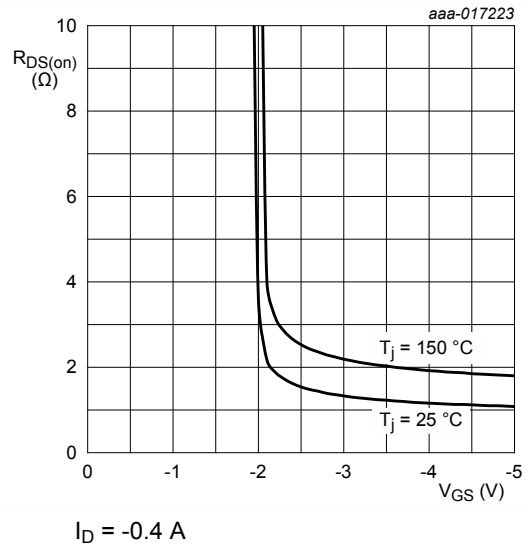
**Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values**



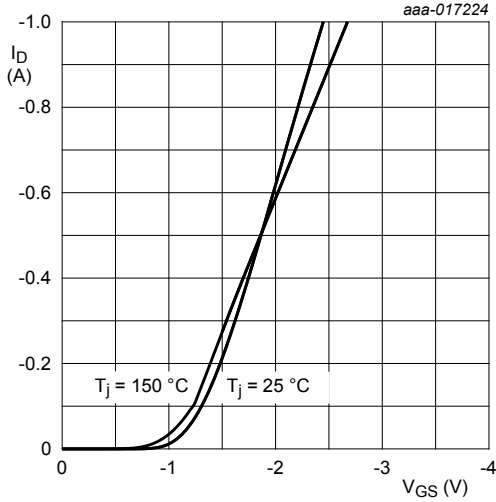
**Fig. 8. Sub-threshold drain current as a function of gate-source voltage**  
 $V_{DS} = -5 \text{ V}$   
 $T_j = 25 \text{ °C}$   
 (1) minimum values  
 (2) typical values  
 (3) maximum values



**Fig. 9. Drain-source on-state resistance as a function of drain current; typical values**

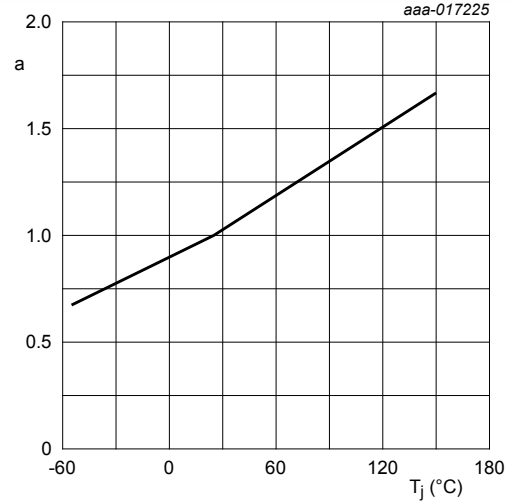


**Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values**  
 $I_D = -0.4 \text{ A}$



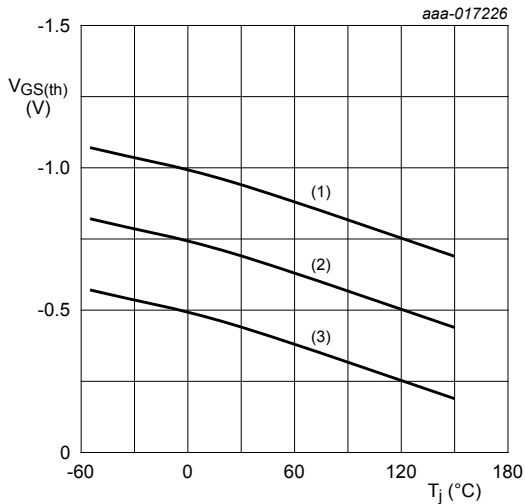
$$V_{DS} > I_D \times R_{DS(on)}$$

**Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values**



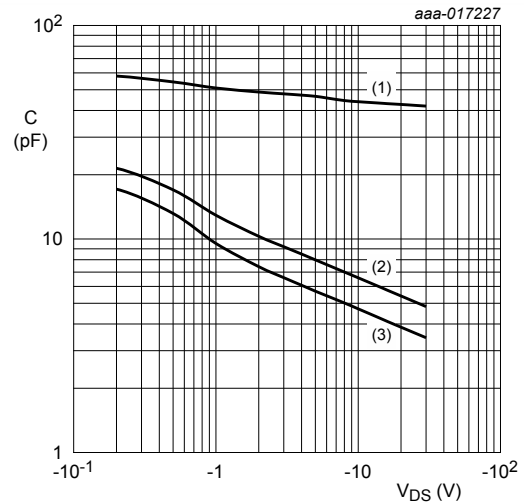
**Fig. 12. Normalized drain-source on-state resistance as a function of ambient temperature; typical values**

$$a = \frac{R_{DS(on)}}{R_{DS(on)@25^\circ C}}$$



$I_D = -250 \mu A; V_{DS} = V_{GS}$   
 (1) maximum values  
 (2) typical values  
 (3) minimum values

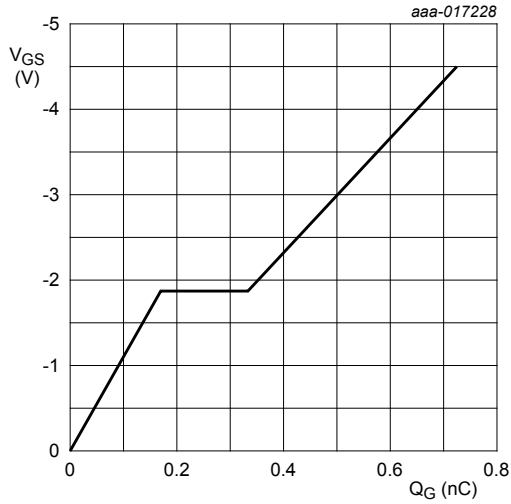
**Fig. 13. Gate-source threshold voltage as a function of junction temperature**



$f = 1 \text{ MHz}; V_{GS} = 0 \text{ V}$   
 (1)  $C_{iss}$   
 (2)  $C_{oss}$   
 (3)  $C_{rss}$

**Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values**



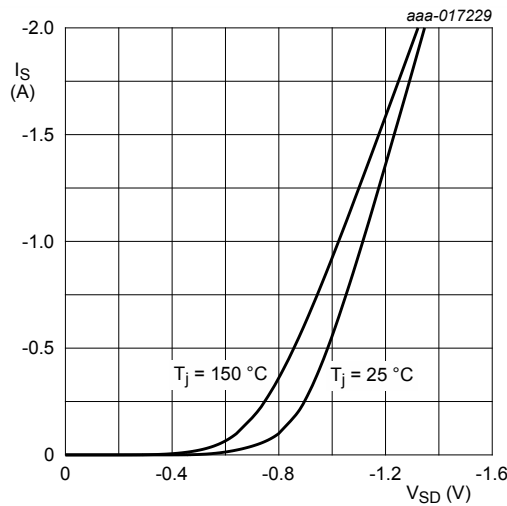


$V_{DS} = -15\text{ V}; I_D = -410\text{ mA } T_{amb} = 25\text{ }^\circ\text{C}$

**Fig. 15. Gate-source voltage as a function of gate charge; typical values**



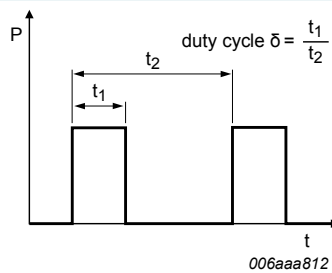
**Fig. 16. Gate charge waveform definitions**



$V_{GS} = 0\text{ V}$

**Fig. 17. Source current as a function of source-drain voltage; typical values**

## 11. Test information

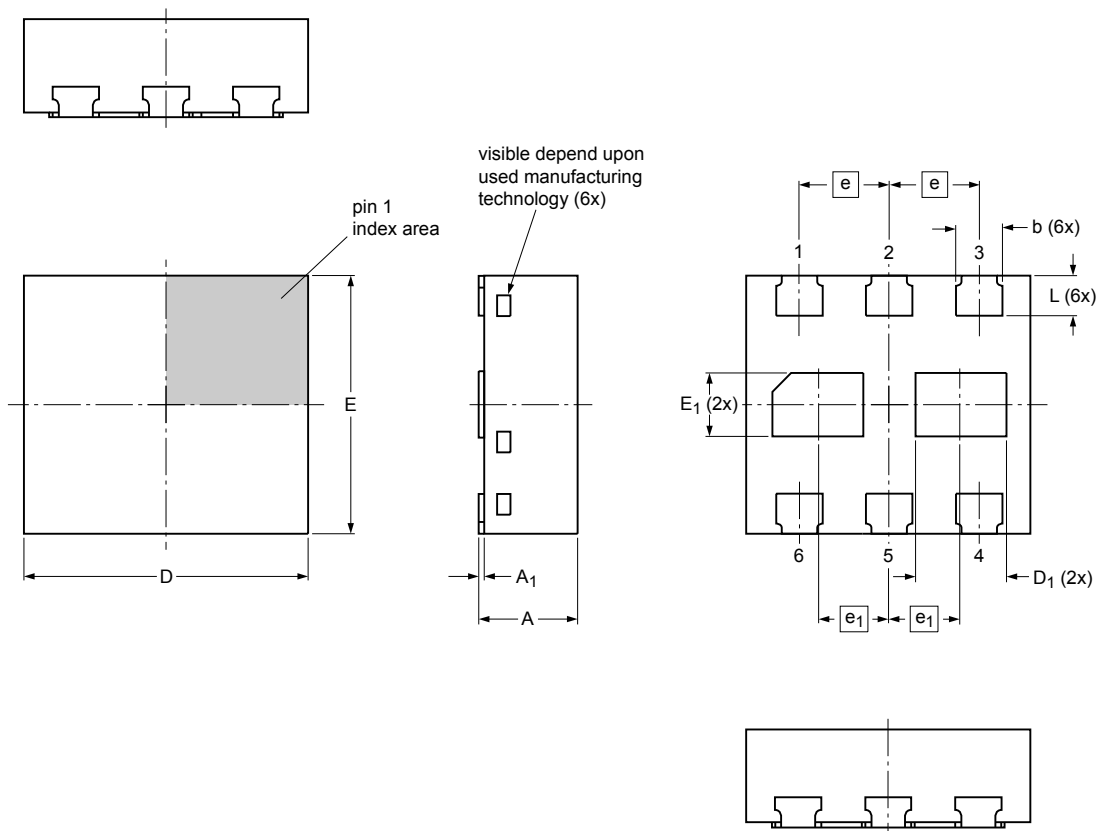


**Fig. 18. Duty cycle definition**

## 12. Package outline

DFN1010B-6: plastic thermal enhanced ultra thin small outline package; no leads;  
6 terminals; body: 1.1 x 1.0 x 0.37 mm

SOT1216



Dimensions (mm are the original dimensions)

Unit	A	A <sub>1</sub>	b	D	D <sub>1</sub>	E	E <sub>1</sub>	e	e <sub>1</sub>	L
min	0.34		0.15	1.05	0.32	0.95	0.22			0.125
mm nom	0.37		0.18	1.10	0.35	1.00	0.25	0.35	0.275	0.155
max	0.40	0.04	0.23	1.15	0.40	1.05	0.30			0.205

Note

1. Dimension A is including plating thickness.

sot1216\_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOT1216					-13-03-05- 13-03-06

Fig. 19. Package outline DFN1010B-6 (SOT1216)

### 13. Soldering

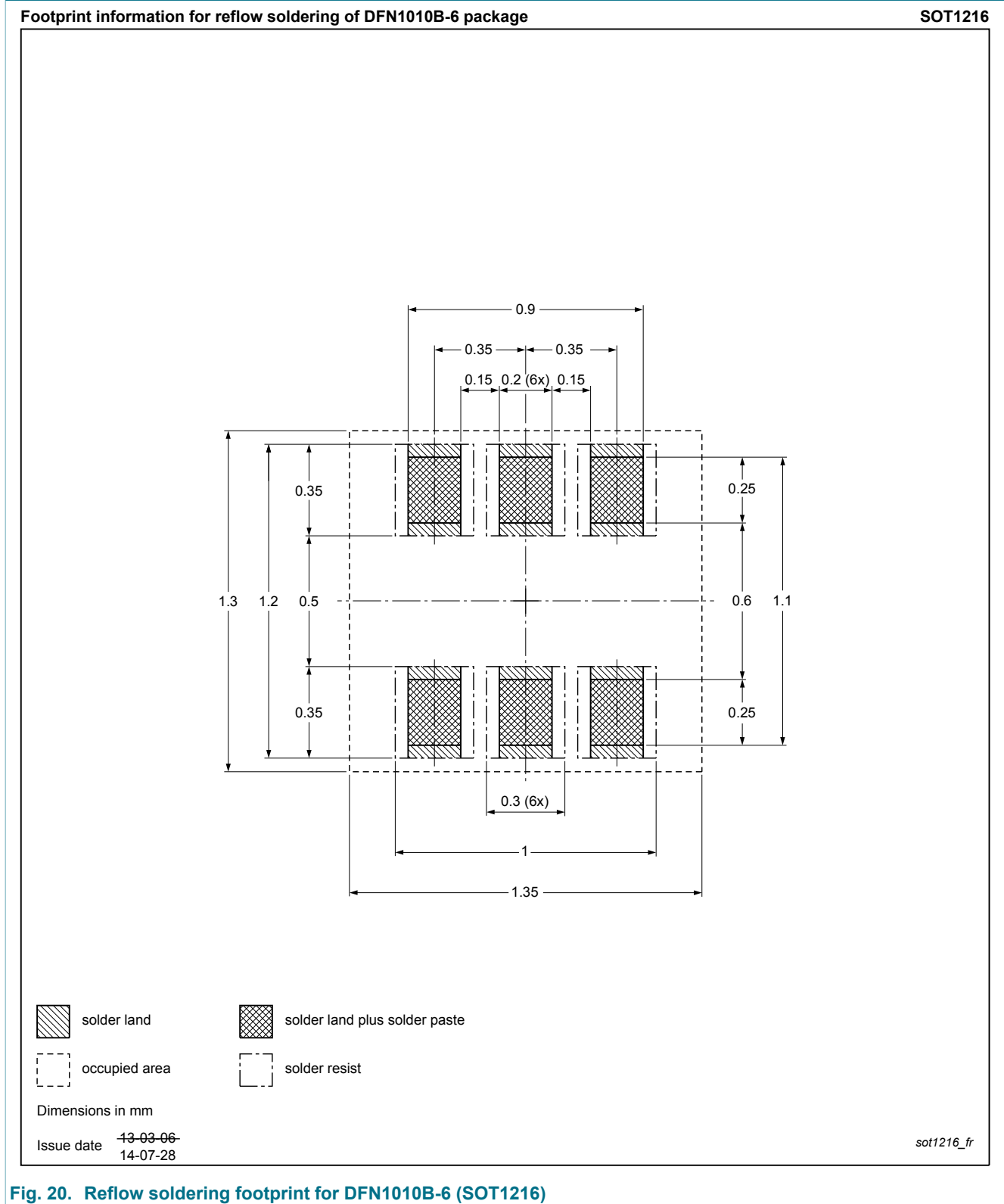


Fig. 20. Reflow soldering footprint for DFN1010B-6 (SOT1216)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMDXB1200UPE v.1	20150325	Product data sheet	-	-

## 15. Legal information

### 15.1 Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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